**Be sure to put your name on each page of your homework in case they become separated.**

**Remember to show ALL of your work for each computational problem, including all relevant formulas that should be used and distribution sketches or scatterplots where appropriate. Simply providing a final answer is NOT sufficient for full credit.**

**Question 1.** Complete each of the following:

**a.** A z score is positive when the original score is above or below the mean? \_\_\_\_\_\_\_\_

**b.** A z score is negative when the original score is above or below the mean? \_\_\_\_\_\_\_\_

**c.** The standard deviation of the standard normal distribution is: \_\_\_\_\_\_\_\_

**d.** The mean of the standard normal distribution is: \_\_\_\_\_\_\_\_

**e. \_\_\_\_\_\_** percentage of observations fall within 2 standard deviations of the mean in a standard normal distribution.

**f.** The entire area under the standard normal distribution curve should always equal: \_\_\_\_\_\_\_

**g.** \_\_\_\_\_\_\_ percentage of observations fall above the mean in a standard normal distribution.

**Question 2.**

Assume that scores on a widely used standardized test are normally distributed with a mean of 750 and a standard deviation of 100. (**Be sure to include a pictorial representation of the distribution**, including the portions that you are trying to solve for in each separate problem.)

**a.** If a college admits only the top 10% of the students taking the test, what is the lowest score a student can obtain and be admitted?

**b.** John scores an 800 on the test while his friend Nadya scores an 875. What percentage of students received a score between the two of them?

**c.** If a student wanted to perform better than at least 30% of all others who take the same test, what score would be required?

**d.** A score of 985 would correspond to what percentile for this test?

**Question 3.**

A random selection of subjects for an experiment from all students within the university guarantees that:

1. at least some subjects will be Freshmen.
2. at least some subjects will be selected from each class.
3. all students have an equal chance of being selected.
4. all classes will be adequately represented.

**Question 4.**

Generalizations from samples to hypothetical populations should be viewed as:

1. inappropriate
2. preliminary
3. erroneous

**Question 5.**

Consider a math class where the possible grades are A, B, C, D, or F, the probability of receiving a grade of A equals .2, and the probability of receiving a grade of B equals .3.

1. The probability of receiving an A or a B equals \_\_\_\_\_\_\_\_.
2. The probability of receiving a grade of B or lower equals\_\_\_\_\_\_\_\_.

**Question 6.**

(a) If the probability equals .03 that any randomly selected person from the general population has an IQ of 130 or above, what is the probability that two randomly selected people both will have IQs of 130 or above?

(b) In the IQ distribution described above, what is the probability that a randomly selected person will have an IQ lower than 130?

**Question 7.**

Assume that the mean weekly study time for the entire student body of a large university is 25 hours, with a standard deviation of 15 hours. Consider the student body to be a population.

Using the appropriate symbols, answer the following questions.

1. What is the mean of the sampling distribution of the mean (N = 100)?
2. What is the standard error of the sampling distribution of the mean (N = 100)?

**Question 8**.

A sample of 100 lab rats run a complex maze and the time it takes each rat to complete the maze is recorded. It is shown that, on average, rats complete the maze in 2.55 minutes. From many replications of the same study over many decades, the standard deviation for all rats to complete the maze has been found to be 0.75 minutes.

(a). With 95% confidence, calculate the expected average population mean of maze completion times.

(b) If you were to calculate a 99% confidence interval, what Z value would you use? How would this change your estimate from part a?

**Question 9.**

According to the central limit theorem, under what conditions will the sampling distribution of the mean approximate a normal curve?

1. If the sample size is sufficiently large.
2. If the sample size is sufficiently small.
3. If the sample size is at least 5.

**Question 10.**

Describe the similarities and differences between a normal distribution from a single sample and the sampling distribution of the mean. Include both similarities or differences in shape, construction, and interpretation.